TABLE 2-1
PROPOSED SAMPLING PROGRAMS
PINES AREA OF INVESTIGATION
RI/FS FIELD SAMPLING PLAN

Samples (a)	Media	Metals (b)	Other Metals	Other Inorganics (c)	Field Parameters (d)	Misc	PAHs (e)	PCDDs/ PCDFs (e)	Rad (solids) (e)	Rad (water) (f)	Physical Parameters (g)	Frequency (i)	No. of Samples (a, j)	Estimated QA/QC Samples (a, j)
MWSE SAP - all samples	CCBs or Suspected CCBs	x		x								1x	34	MS/MSD: 4 FD: 3
MWSE SAP - selected samples	CCBs or Suspected CCBs		Cr^{+6}									1x	12	FD: 1 MS/MSD: 1
MWSE SAP - selected samples (TBD)	CCBs or Suspected CCBs										x	1x	approx. 10	NA
MWSE SAP - all samples	Native soils	x		x								1x	12	FD: 1 MS/MSD: 3
MWSE SAP - selected samples (TBD)	Native soils										x	1x	approx. 10	NA
Yard 520 SAP - all samples	CCBs or Suspected CCBs						x	x	x			1x	10	FD: 1 MS/MSD: 1 RB: 1
Yard 520 SAP - all samples	Native soils	x		x			x	x	x			1x	25	FD: 3 MS/MSD: 2
Yard 520 SAP - selected samples (TBD)	Native soils										x	1x	approx. 5	NA
CCB samples from Type II (North) Area at Yard 520	CCBs	x		x								1x	3	FD: 1 MS/MSD: 1 RB: 1
Vertical Profiling - all samples	Groundwater (screening-level)	B Mo			x							1x	approx. 20	FD: 2 MS/MSD: 1
Monitoring wells - samples specified in Sec 2.4.3	Groundwater	x		x	x	Anionic surfactants; DOC						4x	approx. 29	FD: 3 MS/MSD: 2 RB: 3
Monitoring wells - all samples (Sec 2.4.3)	Groundwater					B-isotope ratio						1x	approx. 34	FD: 4 MS/MSD: 2 RB: 4
Monitoring wells - samples specified in Sec 2.4.3	Groundwater		Li (11)			Tritium (5 wells)				x (11)		1x	approx. 5 to 11	FD: 1 to 2 MS/MSD: 1 RB: 1

TABLE 2-1
PROPOSED SAMPLING PROGRAMS
PINES AREA OF INVESTIGATION
RI/FS FIELD SAMPLING PLAN

Samples (a)	Media	Metals (b)	Other Metals	Other Inorganics (c)	Field Parameters (d)	Misc	PAHs (e)	PCDDs/ PCDFs (e)	Rad (solids) (e)	Rad (water) (f)	Physical Parameters (g)	Frequency (i)	No. of Samples (a, j)	Estimated QA/QC Samples (a, j)
Surface water samples - all	Surface water	x		x	x	DOC; TSS; Hardness						4x	approx. 24	FD: 3 MS/MSD: 2
Sediment samples (0-6 in) - all	Sediment	x		x		TOC; % moisture					x	1x	20	FD: 2 MS/MSD: 1 RB: 2
Sediment samples - (6-12 in) (h)	Sediment	x		x		TOC; % moisture					x	1x	approx. 6	FD: 1 MS/MSD: 1 RB: 1
Private well samples - all	Private well water					B-isotope ratio; Tritium						1x	approx. 11	FD: 2 MS/MSD: 1
Private well samples - all	Private well water	x		x	x	Anionic surfactants; DOC						4x	approx. 11	FD: 2 MS/MSD: 1

Notes:
(a) TBD - to be determined, specific numbers and locations to be determined.
(b) Metals for solid samples (CCBs and soils): Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Mo, Ni, K, Se, silicon (Si), Ag, Na, Tl, V, Zn.
Metals for groundwater and surface water samples: Al, As, Ba, B, Cd, Ca, Cr, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, silicon (Si), Sr, Na, Tl, V, Zn.
Surface water samples will be submitted both filtered and unfiltered to be analyzed for As, Cd, Cr, Cu, Pb, Ni, Se, and Zn. All other analytes will be analyzed on unfiltered samples.
Metals for sediment samples: Al, As, Ba, B, Cd, Ca, Cr, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Si, Na, Tl, V, Zn.
(c) Other inorganics for solid samples: sulfur (S).
Other inorganics for groundwater and surface water samples: NH_4, HCO_3, Cl, F, NO_3, PO_4, sulfide (S^{-1}), SO_4, and silica (Si).
(d) Field parameters, unless otherwise specified: specific conductance, temperature, pH, DO, ORP, and turbidity.
(e) Specific parameter lists for PAHs, PCDDs/PCDFs, and radiological parameters (for soil) are provided in the Yard 520 SAP (ENSR, 2005b).
(f) Radiological parameters for groundwater samples include U-234, U-235, U-238, Ra-226, and Ra-228.
(g) Physical Parameters: grain size and bulk density.
(h) All additional deeper sediment samples (6-12 in) will be retained by laboratory for later analysis, if required.
(i) Frequency - sampling locations and parameter lists may be modified for subsequent sampling event(s) based on results of initial sampling event(s).
(j) Sample numbers and QA/QC samples are estimates; actual numbers will be based on final sample numbers and field conditions.
MSWE SAP (ENSR, 2004)
Yard 520 SAP (ENSR, 2005b)
FD - field duplicates
MS/MSD - matrix spike/matrix spike duplicate
RB - rinse blank
DOC - dissolved organic carbon
TSS - total suspended solids
ORP - oxydation-reduction potential
PAH - polycylcic aromatic hydrocarbons
PCDD/PCDF - polychlorinated dibenzodioxin/polychlorinated dibenzofuran
TOC - total organic carbon

TABLE 2-2
WELL CONSTRUCTION INFORMATION - YARD 520
PINES AREA OF INVESTIGATION
RI/FS FIELD SAMPLING PLAN

Well Name	Original Name	Date of Installation	Ground Elevation (ft)	Top of Casing (TOC) Elevation (ft)	Depth of Screened Interval (ft bgs)	Depth to Groundwater (ft from TOC) September 2002	Depth to Clay (ft bgs)
MW-1	MW-1	Apr-89	622.0	624.11	17 to 27	9.72	27
MW-2	PL-2	Apr-89	619.9	621.70	4 to 14	9.53	13.5
MW-3	MW-3	Apr-89	616.0	617.75	5 to 15	12.27	11.5
MW-3A	PL-3	Feb-89	620.9	623.26	10 to 20	12.07	20
MW-4	MW-4	Apr-89	619.1	620.49	6 to 16	13.49	14
MW-4A	PL-4	Feb-89	621.2	623.88	44 to 49	10.68	21
MW-5	MW-2	Apr-89	608.9	610.19	5 to 15	4.98	11.5
MW-6	MW-6	Oct-97	627.4	629.73	23 to 33	16.45	37
MW-7	MW-7	Sep-99	624.9	627.32	12 to 22	12.96	33
MW-8	MW-8	Aug-01	612.4	615.84	6 to 16	11.69	14.5
P-9	P-9	Aug-01	617.6	620.79	7.9 to 12.9	13.61	13
P-10	P-10	Aug-01	614.5	617.04	3.5 to 13.5	5.82	14
TW-10	TW-10	Aug-02	614.5	615.98	4 to 14	4.84	14
MW-11	MW-11	Aug-01	609.0	612.04	11 to 16	6.25	16
TW-12	TW-12	Jul-01	624.0	626.82	21 to 31	13.37	31
MW-13D	TW-13D	Aug-02	625.5	626.97	24 to 34	13.03	33.5
MW-13S	TW-13S	Aug-02	625.5	626.97	6 to 16	11.98	33.5
MW-14D	TW-14D	Aug-02	626.1	627.75	27 to 37	14.19	36.5
MW-14S	TW-14S	Aug-02	626.1	627.78	8 to 18	13.27	36.5
TW-15D	TW-15D	Aug-02	628.0	629.71	28 to 38	16.63	38
TW-15S	TW-15S	Aug-02	628.0	629.60	11 to 21	16.68	38
TW-16D	TW-16D	Aug-02	630.0	631.45	33 to 43	21.61	42
TW-16S	TW-16S	Aug-02	630.0	631.38	16.5 to 26.5	20.84	42
TW-17D	TW-17D		631.9	633.38	26 to 36	20.59	42
TW-17S	TW-17S	Aug-02	631.9	633.42	16 to 26	20.62	42
TW-18D	TW-18D	Aug-02	634.8	636.32	37 to 47	26.14	47
TW-18S	TW-18S	Aug-02	634.8	636.41	20 to 30	25.12	47
TW-19D	TW-19D	Aug-02	630.3	632.70	33.5 to 43.5	23.47	43.5
TW-19S	TW-19S	Aug-02	630.3	632.81	17 to 27	23.21	43.5

Well construction and geologic logs are included in the SMS (ENSR, 2005).
Survey information obtained from Weaver Boos files and records.
Data from September 2002 from Supplemental Field Investigation, Weaver Boos, October 7, 2002.
bgs - below ground surface.

TABLE 2-3
GROUNDWATER MONITORING AT YARD 520 (AS OF JULY 2005)
PINES AREA OF INVESTIGATION
RI/FS FIELD SAMPLING PLAN

Monitoring Well	Frequency	Metals 1 (a)	Metals 2 (b)	Other Inorganics (c)	Field Parameters (d)	Comments
MW-1	Semi-Annual	x	x	x	x	
MW-3	Semi-Annual	x	x	x	x	
MW-4	Semi-Annual	x	x	x	x	
MW-6	Semi-Annual	x	x	x	x	
MW-7	Semi-Annual	x	x	x	x	
MW-8	Semi-Annual	x	x	x	x	
MW-10	Semi-Annual	x	x	x	x	
MW-11	Semi-Annual	x	x	x	x	
MW-13S	Semi-Annual	x	x	x	x	
MW-13D	Semi-Annual	x	x	x	x	
MW-14S	Semi-Annual	x	x	x	x	
MW-14D	Semi-Annual	x	x	x	x	
TW-12	Semi-Annual	x	x	x	x	Temporary Well
TW-15S	Semi-Annual (e)	x		x	x	Temporary Well
TW-15D	Semi-Annual (e)	x		x	x	Temporary Well
TW-16S	Semi-Annual (e)	x		x	x	Temporary Well
TW-16D	Semi-Annual (e)	x		x	x	Temporary Well
TW-17S	Semi-Annual (e)	x		x	x	Temporary Well
TW-17D	Semi-Annual (e)	x		x	x	Temporary Well
TW-18S	Semi-Annual (e)	x		x	x	Temporary Well
TW-18D	Semi-Annual (e)	x		x	x	Temporary Well
TW-19S	Semi-Annual (e)	x		x	x	Temporary Well
TW-19D	Semi-Annual (e)	x		x	x	Temporary Well

Notes:
(a) Metals 1 include As, Ba, B, Fe, Mo, Mn, Ni, Pb, K, Na.
(b) Metals 2 include Cd, Cu, Cr, Hg, Se, Ag, Zn.
(c) Other inorganic constituents include: Cl, cyanide, F, SO4, NO3, S (sulfide), total dissolved solids (TDS).
(d) Field parameters include pH, specific conductance, and temperature.
(e) The following parameters analyzed annually at selected wells: Ba, cyanide, F, NO3.
Purging and sampling conducting using bailers; samples for metals filtered before analysis.

TABLE 3-1
SAMPLE CONTAINERS, PRESERVATIVES, AND HOLDING TIME REQUIREMENTS
PINES AREA OF INVESTIGATION
RI/FS FIELD SAMPLING PLAN

Analytical Parameters	Containers (a, b, f)	Preservation	Holding Time (c)
Aqueous Samples			
Metals (d) and hardness	500-ml plastic bottle	HNO_3 to pH < 2 Cool 4°C	180 days
Metals (d), dissolved	500-ml plastic bottle	Filter in field prior to preservation HNO_3 to pH < 2 Cool 4°C	180 days
Sulfate (SO_4), chloride (Cl), fluoride (F), nitrate (NO_3)	500-ml plastic bottle	Cool 4°C	28 days (48 hours for nitrate)
Orthophosphate (PO_4)	500-ml plastic bottle	Cool 4°C	48 hours
Ammonia (NH_4)	Plastic or glass bottle	H_2SO_4 to pH < 2 Cool 4°C	28 days
Bicarbonate (HCO_3)	Plastic bottle	Cool 4°C	14 days
Sulfide (S^{-1})	500-m plastic	Cool, 4°C; Zinc acetate; 2-3 pellets NaOH to pH > 9	7 days
TSS	Plastic or glass bottle	Cool 4°C	7 days
DOC	40-ml glass bottle	Filter in field Cool 4°C	28 days
Silica (Si)	Plastic bottle	Cool 4°C	28 days
Anionic Surfactants	1-L plastic bottle	Cool 4°C	48 hours
U-234, U-235, U-238, Ra-226, Ra-228	1-gal plastic cubitainer	HNO_3 to pH < 2 Cool 4°C	6 months
Solid Samples (CCBs, soil, sediment)			
Metals (d)	Wide-mouth 500-ml plastic jar (e)	Cool 4°C	180 days; mercury 28 days
Sulfur (S)	Wide-mouth 500-ml plastic jar	Cool 4°C	28 days
Grain Size Distribution	Wide-mouth glass	Cool 4°C	None
Bulk Density	500-ml plastic or glass jar	Cool 4°C	None
TOC	Glass jar	Cool 4°C	14 days

Notes:
(a) Additional volume will be collected for MS/MSD samples.
(b) Laboratory may provide alternative containers as long as the containers meet the requirements of the method and allow the collection of sufficient volume to perform the analyses.
(c) Holding times begin at the date and time of sample collection.
(d) Specific analytes provided in Table 2-1 and the QAPP.
(e) If glass containers are used, they must be certified clean for boron and silicon.
(f) Aqueous samples in glass containers are to be placed in zipper-lock bags prior to shipping.
See the current version of the QAPP for requirements for tritium and boron-isotope ratio analyses.
CCB - coal combustion by-product
TOC - total organic carbon
TSS - total suspended solids
QAPP - Quality Assurance Project Plan
MS/MSD - matrix spike/matrix spike duplicate